

Web Offset Press Operating

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Each printing couple on a blanket-to-blanket web offset lithographic press consists of four basic elements:

A dampening system, consisting of a fountain pan holding a supply of dampening solution, and a series of rollers that apply the solution to the plate.

- An inking system, consisting of a fountain trough holding a supply of ink, and a series of rollers that carry the ink from the fountain to the plate.

- A plate cylinder, on which the plate is mounted. The plate is a thin metal sheet that wraps around the cylinder surface and carries the image.

- A blanket cylinder, on which the blanket is mounted. The blanket is a sheet of fabric that is covered with synthetic rubber. It picks up the inked image from the plate and transfers it to the paper.

Because the blanket-to-blanket press uses rotating image-carrying cylinders, it is classified as a rotary press. Each revolution of the plate cylinder is called an impression; these nearly continuous impressions account for the efficiency of such presses. Cylinders must be timed relative to each other.

With properly made plates, water from the dampening system adheres to all the nonprinting, or nonimage, areas. This control is so selective that points as small as 0.0002 in. (0.005 mm), completely surrounded by nonimage areas, can be reproduced. As the plate cylinder turns, the inking system puts the ink on the plate. The greasy ink will not adhere to the dampened nonimage areas, but does adhere to the unwetted image areas of the plate.

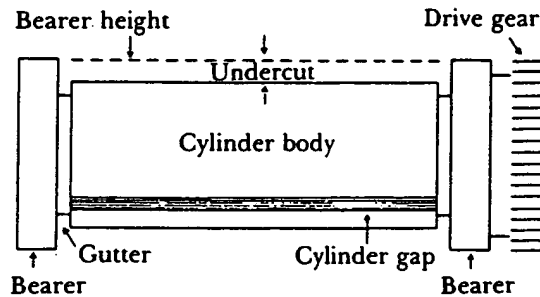
There is one fundamentally important aspect of this system: no ink or water will transfer without proper pressure between the elements making the transfer. The plate cylinder and the blanket cylinder have to run with pressure between them to transfer ink; running contact is not enough. There must also be adequate pressure between the blanket and the paper. Pressure is critical in lithography. Tolerances in squeeze may be as low as 0.002 in. (0.05 mm). The procedure for setting cylinder pressures is called *packing*.

The Plate Cylinder

The basic features of all plate cylinders are the same. Almost all have **bearers**: smooth, flat metal rings at the extreme ends of the cylinder. Just inside each bearer (between bearer and cylinder body) is a narrow groove, called the **gutter**. Between the two gutters is the **body**—the main portion of the cylinder—on which the plate and packing are mounted.

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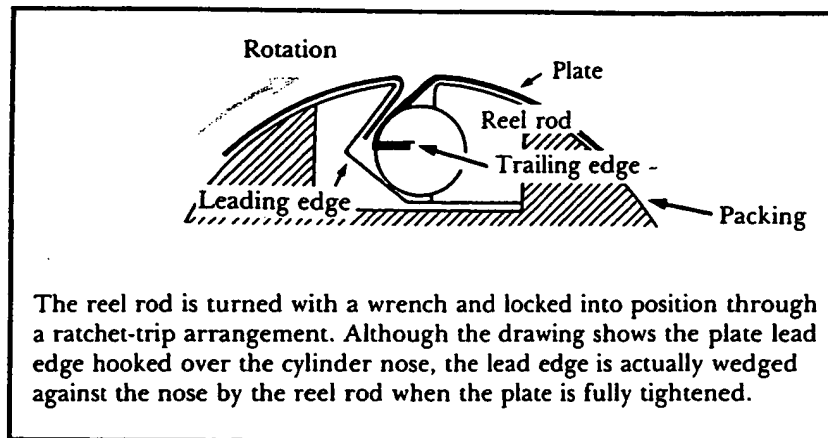
A printing-unit cylinder with the major elements identified



The body of the cylinder is always lower than the surface of the bearers; the exact difference in height—called the **cylinder undercut**—varies with the specifications agreed on by the manufacturer and the printing plant. Often, the amount of undercut is specified by the plant ordering the press. The exact amount of undercut on the plate cylinder must be known in order to set proper pressures in the printing unit.

The surface of the plate cylinder body does not extend all the way around the cylinder circumference. On nearly all presses, a deep gap runs from gutter to gutter across the cylinder. This gap contains clamping devices that hold the plate tightly onto the cylinder. These are the basic mechanisms of the plate lockup.

Cross section of a typical plate lockup mechanism, showing the plate fully tightened
Courtesy Harris Graphics Corp.



The leading edge of the plate cylinder is the edge along the gap that is followed by the cylinder body as the cylinder rotates in the running direction. The trailing edge is followed by the cylinder gap. The leading edge of the gap is machined at an acute angle to the surface of the cylinder

body, and the leading edge of the plate is bent to this angle before mounting on the press. The plate is inserted in the slot at the lead edge and the lockup at the trailing edge, which provide the gripping force necessary to hold the plate tightly and smoothly against the cylinder.

The gap represents a nonprinting area. The white space left on the web by the cylinder gap is ultimately where the web is cut into sheets and subsequently folded into *signatures*. The cutoff length of a press is fixed in that it may measure any one of a number of specified sizes. When ordering a web offset press, the printer must know what work will be run, as the fixed cutoff on these presses presents some limitations.

The gap on the plate cylinder is usually about $\frac{1}{8}$ in. (3 mm) narrower than that on the blanket cylinder. The leading edge of the plate should rotate ahead of the leading edge of the blanket by about $\frac{1}{16}$ in. (1.6 mm), and the plate trailing edge should follow that of the blanket by the same amount. The reason for the wider blanket gap is that the blanket and its mounting bars are much thicker than the plate and require a wider lockup.

The undercut on a plate cylinder is usually much less than the undercut on a blanket cylinder, simply because plates are thinner than blankets. Plate thickness or gauge depends on the size of the plate, usually increasing with plate size. Gauges normally vary from 0.012 in. (0.3 mm) for a 17 × 22-in. plate up to 0.025 in. (0.64 mm) on large plates. Some plates caliper as thick as 0.030 in. (0.76 mm), but the use of plates in the 0.025–0.030-in. (0.64–0.76-mm) range on web offset presses is uncommon.

The plate cylinder gap falling inside the blanket cylinder gap, indicating proper timing

Courtesy Harris Graphics Corp.

The blanket cylinder gap is about $\frac{1}{8}$ in. (3 mm) wider than the plate cylinder gap. The cylinders are shown spread apart for easier visualization.

